Dry-Wood Termite Attacks in a 55-Year-Old Display of Hawaii-Grown Wood

R. Sidney Boone[1]

ABSTRACT: Display racks built in 1909 to exhibit various woods grown in Hawaii provided some unique observations on dry-wood termite infections. Of 79 wood samples, including 76 species, 54 samples were not attacked. It is quite likely that this may be the only record of dry-wood termite resistance for many of these species.

As they are in most tropical areas of the world, dry-wood termites (*Cryptotermes brevis* Walker) are a serious problem in Hawaii. These insect pests differ from subterranean termites in that they live entirely in wood, never enter the ground, and require but little moisture for existence. Established colonies of subterranean termites normally maintain contact with the ground—usually in the form of earthern tunnels—for their constant supply of moisture. Colonies of dry-wood termites grow slowly. They are usually much smaller than colonies of subterranean termites. Dry-wood termites can attack wood with a moisture content as low as 10–12% and possibly even lower (Hunt and Garrett, 1953:53). Consequently they are found in the upper structural parts of houses, telephone and utility poles, furniture, fiber insulation board, pianos, paper, and other wood products having a low moisture content.

Three display racks built in 1909 provided us with some unique observations on dry-wood termite infestations. They were built to exhibit various woods grown in the Hawaiian Islands. In 1910 they won a gold medal at the Alaska-Yukon-Pacific Exposition in Seattle. Since then,

[1] Pacific Southwest Forest and Range Experiment Station, Forest Service, U. S. Department of Agriculture, Honolulu, Hawaii. Manuscript received October 21, 1965.

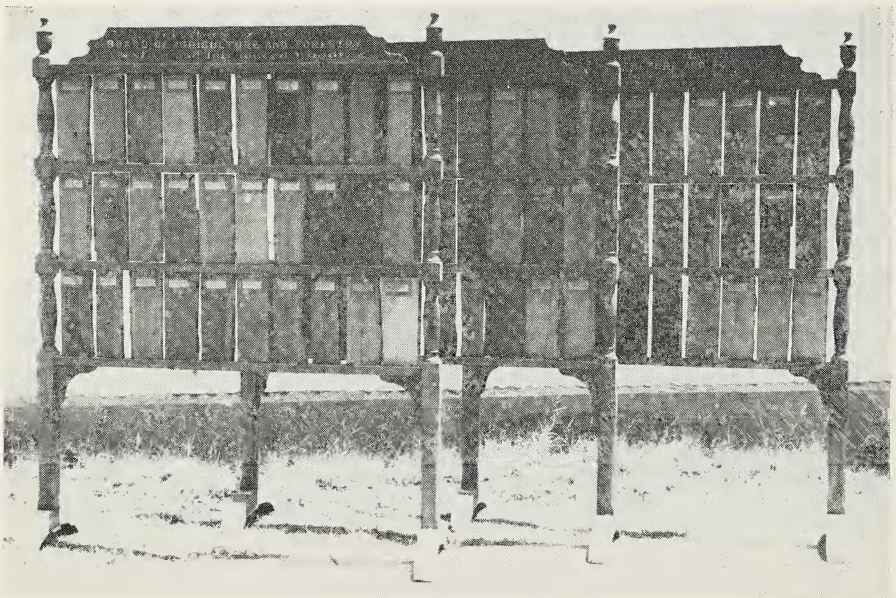

Fig. 1. Display racks in 1965.

TABLE 1

DRY-WOOD TERMITE ATTACKS IN HAWAII-GROWN WOOD

SCIENTIFIC NAME[1]	COMMON NAME	TERMITE ATTACK				SAMPLES FIT SNUGLY IN RACK	TERMITES IN RACK ADJACENT TO SAMPLES
		NONE	OCCASIONAL	MODERATE	SEVERE		
Acacia koa Gray	koa	x	–	–	–	–	x
Acacia koa Gray	koa	x	–	–	–	–	–
Acacia koa Gray	koa	–	x	–	–	x	x
Acacia koaia Hbd.	koaia	x	–	–	–	–	–
Acacia melanoxylon R. Br.	blackwood acacia	x	–	–	–	–	–
Albizzia lebbek Benth.	siris-tree	–	x	–	–	x	x
Aleurites moluccana Willd.	kukui	x	–	–	–	–	–
Alphitonia ponderosa Hbd.	kauila	x	–	–	–	–	–
Antidesma platyphyllum Mann	hame	–	x	–	–	–	–
Artocarpus altilis L.	breadfruit	–	–	–	x	x	x
Bobea mannii Hbd.*	ahakea	x	–	–	–	–	–
Byronia sandwicensis Endl.*	aiea	x	–	–	–	–	–
Caesalpinia sappan L.*	sappan	–	–	x	–	x	x
Calophyllum inophyllum L.	kamani	x	–	–	–	–	–
Canthium odoratum F.V.M.	alahee	x	–	–	–	–	–
Ceiba pentandra L.	kapok	x	–	–	–	–	–
Cheirodendron gaudichaudii Seem	olapa	x	–	–	–	x	–
Cheirodendron gaudichaudii Seem	olapa	x	–	–	–	x	–
Citrus aurantium L.*	orange	x	–	–	–	x	–
Cocos nucifera L.	coconut	–	x	–	–	–	x
Cordia subcordata Lam.	kou	x	–	–	–	–	–
Coprosma longifolia Gray*	pilo	–	x	–	–	–	–
Coprosma waimeae Wawra*	olena	x	–	–	–	x	–
Cryptocarya mannii Hbd.	holio	x	–	–	–	–	–
Diospyros ferrea	lama	x	–	–	–	x	–
Dracaena aurea Mann	hala-pepe	x	–	–	–	–	–
Dubautia plantaginea Gaud.*	naenae	–	x	–	–	–	–
Elaeocarpus bifidus Hook. et Arn.	kalia	–	x	–	–	–	–
Erythrina sandwicensis Degener	wiliwili	x	–	–	–	–	–
Eucalyptus calophylla R. Br.	Port Gregory eucalyptus	x	–	–	–	–	–
Eucalyptus citriodora Hook.[2]	lemon eucalyptus	x	–	–	–	x	–
Eucalyptus globulus Labill.	bluegum eucalyptus	x	–	–	–	–	–
Eucalyptus goniocalyx F. Muell.	mt. graygum eucalyptus	x	–	–	–	–	–
Eucalyptus gummifera Hochr.	bloodwood eucalyptus	x	–	–	–	–	x
Eugenia cumini L.	Java plum	x	–	–	–	x	x
Eugenia malaccensis L.	mountain apple	x	–	–	–	x	–
Eugenia sandwicense Ndz.	ohia ha	x	–	–	–	–	–
Euphoria longana (Lour.) Steud.	longan	x	–	–	–	–	x

TABLE 1 (*Continued*)

Euphorbia lorifolia Lam.	'akoko	–	–	–	x	x	x
Grevillea robusta A. Cunn.[2]	silk-oak	–	–	–	x	x	x
Hibiscus arnottianus Gray*	kokio	–	–	–	x	x	x
Hibiscus tiliaceus L.	hau	x	–	–	–	–	–
Mangifera indica L.	mango	x	–	–	–	–	–
Metrosideros collina Forst.	ohia lehua	–	x	–	–	–	–
Morinda citrofolia L.	noni	x	–	–	–	x	–
Myoporum sandwicense Gray	naio	x	–	–	–	–	–
Pandanus tectorius Sol.	pandanus	x	–	–	–	x	–
Pelea anisata Mann*	mokihana	x	–	–	–	x	–
Pelea sandwicensis Gray*	alani	–	–	–	x	x	x
Perrottetia sandwicensis Gray	olomea	–	–	–	x	x	x
Pipturus albidus Gray	mamake	–	–	–	x	x	x
Pisonia sandwicensis Hbd.*	aulu	–	x	–	–	x	–
Pithecellobium saman Benth.	monkey-pod	x	–	–	–	–	–
Pittosporum glomeratum Hbd.	hoawa	x	–	–	–	–	–
Pittosporum kauaiense Hbd.*	hoawa	x	–	–	–	–	–
Psidium cattleianum Sabine	strawberry guava	–	x	–	–	x	x
Psidium guajava L.[2]	gauva	–	x	–	–	–	–
Psychotria hexandra Mann*		x	–	–	–	–	–
Pterotropia gymnocarpa Hbd.*	ohe-ohe	x	–	–	–	–	–
Pterotropia kauaiensis Hbd.*	ohe-ohe	–	–	x	–	–	–
Rauwolfia sandwicensis A.D.C.	hao	x	–	–	–	–	–
Rhus javanica L.	neneleau	x	–	–	–	–	–
Santalum ellipticum Gaud.*	sandalwood	x	–	–	–	x	x
Santalum pyrularium Gray*	sandalwood	x	–	–	–	–	–
Scaevola chamissoniana Gaud.*	naupaka	x	–	–	–	–	–
Sideroxylon sandwicensis B. et H.*	alaa	x	–	–	–	–	–
Solanum sandwicense H. et A.*	popolo	–	–	x	–	–	–
Straussia kaduana Gray*	kapiko-kea	x	–	–	–	–	–
Suttonia lessertiana Pax*	kolea	x	–	–	–	–	–
Suttonia lessertiana Pax*	kolea	x	–	–	–	–	–
Swietenia mahagoni L.*[3]	West Indies mahogany	x	–	–	–	x	–
Tamarindus indica L.*	tamarind	–	x	–	–	x	x
Terminalia catappa L.[2]	false kamani	x	–	–	–	–	–
Tetraplasandra waimeae Wawra*	ohe-kikoola	–	x	–	–	–	–
Thespesia populnae Corr.	milo	x	–	–	–	–	–
Thevetia neriifolia Juss.	be-still tree	–	x	–	–	x	–
Wikstroemia sandwicensis Meisn*	akia	x	–	–	–	–	x
Xylosma hawaiiense Seem.*	maua	x	–	–	–	–	–
Zanthoxylum oahuense Hbd.*	ae	–	–	x	–	x	x

[1] Scientific names indicated by * are those used by J. F. Rock in 1910. Others follow Bryan and Walker (1962) or Neal (1948).
[2] Listed as "very susceptible to attack" by Wolcott (1946).
[3] Listed as "most resistant to attack" in Wolcott (1946).

the racks have been displayed or stored in various parts of Honolulu, always in areas accessible to dry-wood termites.

Almost nothing is known about the resistance of many Hawaii-grown woods to dry-wood termite attack. All observations that may give some indication of differences in resistance are desirable. These display racks gave us such an opportunity for samples of 76 wood species.

Woods for the display were collected throughout the islands by J. F. Rock, territorial botanist. The racks were built of koa. Each rack held 30 specimens (Fig. 1). Each specimen measured 1 by 5 by 12 inches. The bark was exposed on one edge. The specimens were mounted with metal rods, extending about ½ inch into the top and bottom, allowing them to rotate in the rack. A label on the sample showed the common and scientific names. Of the original 90 wood samples, 79 specimens, including 76 species, are still labeled and identifiable. Only 2 specimens are missing, and 9 others have lost their name plates (Fig. 1).

In 1965 each specimen block was carefully inspected from all sides and all angles. They were not removed from the rack nor were cuts made in them. In two specimens the termites were still active. No information is available as to the age of any colony or how quickly an infested specimen was damaged.

Termite attack was arbitrarily divided into four classifications: none (no holes); occasional (1–3 holes); moderate (3–10 holes); and severe (completely riddled, in some only a shell left). There was no difficulty in deciding on the proper category for a given sample.

Of the 79 specimens, only 25 were attacked by the dry-wood termites (Table 1). Of these, only 7 were severely attacked, 4 had moderate attack, and 14 had occasional attack. The remaining 54 specimens were not attacked.

In some instances, the attack or lack of it was not in keeping with published data or local experience. Koa, for example, is known to be subject to attack, and the koa racks were infested. But only 1 of the 3 samples of koa showed attack. On the other hand, ohia is believed to be resistant, and yet the sample of ohia showed an occasional attack.

Termite attacks were found more often in those samples that fitted rather tightly in the frame, that is, they touched the frame at either the top or bottom. But several samples that fitted snugly were not attacked. Because all samples originally had bark, there was equal opportunity for termites to enter between the bark and sapwood.

An attempt to segregate attacks as being in sapwood or heartwood was unsuccessful. Many of the samples had no heartwood owing to the smallness of the tree from which they came. On most of the light colored woods it was impossible to separate heartwood and sapwood owing to discoloration from weathering.

Quite likely this may be the only record of dry-wood termite resistance for many of these species in Hawaii. Although these samples have not been observed periodically over the years for termite damage, their exposure for more than 50 years in areas known to have dry-wood termites should provide some definite signs of their susceptibility to insect attack. A controlled experiment would be a more desirable way of studying this problem, but it is doubtful that this will be done because many of these tree species have little or no economic value.

REFERENCES

BRYAN, L. W., and CLYDE M. WALKER. 1962. A provisional check list of some common native and introduced forest plants in Hawaii. U. S. Forest Serv. Pacific Southwest Forest and Range Expt. Sta. Misc. Paper 69, 36 pp.

HUNT, G. M., and G. A. GARRETT. 1953. Wood Preservation. McGraw-Hill Book Co., New York. 417 pp., figs.

NEAL, M. C. 1948. In Gardens of Hawaii. B. P. Bishop Museum Spec. Publ. 40, Honolulu, Hawaii. 805 pp., figs.

WOLCOTT, G. N. 1946. A list of woods arranged according to their resistance to the attack of the West Indian dry-wood termite *Cryptotermes brevis*. Caribbean Forester 7(4):329–334.